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**Masters et al.**

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(54) **MODULAR TRANSIT SYSTEM**

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14, 2010, now Pat. No. 8,579,350.

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14, 2009.

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**B60N 2/24** (2006.01)  
**A47C 9/06** (2006.01)  
**B60N 2/04** (2006.01)

(52) **U.S. Cl.**

CPC . **B60N 2/242** (2013.01); **A47C 9/06** (2013.01);  
**B60N 2/04** (2013.01); **Y10T 29/49826**  
(2015.01)

(58) **Field of Classification Search**

CPC ..... **B60N 2/242**; **B60N 2/01**; **A47C 9/06**  
USPC ..... **297/440.14**, **440.15**, **440.16**, **440.2**,  
**297/440.22**, **353**, **337**

See application file for complete search history.

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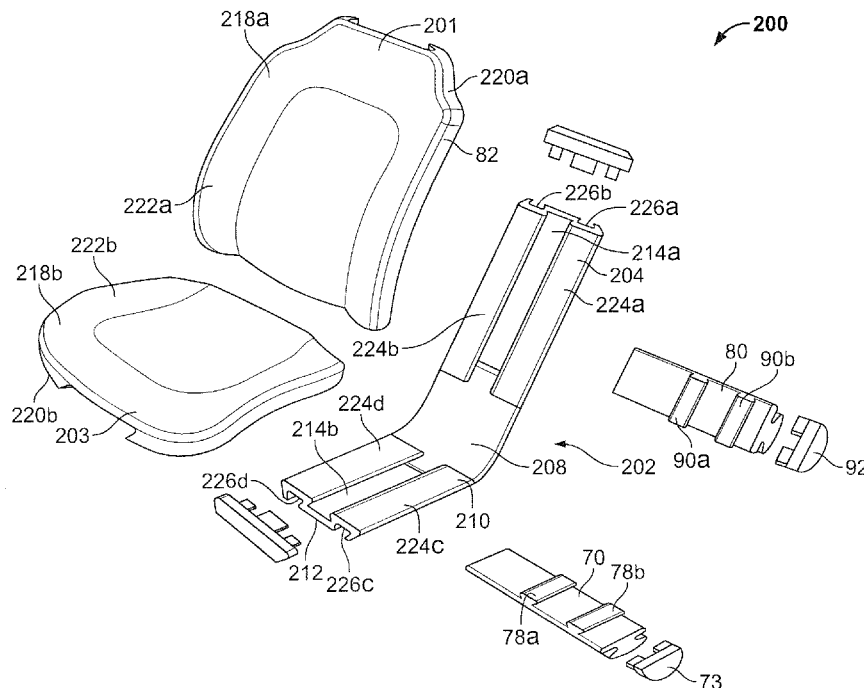
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(57) **ABSTRACT**

A modular seat assembly having an elongate support spine extending longitudinally from a first end to a second end is provided. A seat portion is connected to a front side of the support spine, and each of the seat portion and the support spine includes one of a complementary pair of interlocking portions. The interlocking portion of the seat portion slides onto the interlocking portion of the support spine over the first end. The modular seat assembly further includes an end cap lockably disposed over the first end that prevents the seat portion from sliding off the support spine.

**5 Claims, 7 Drawing Sheets**



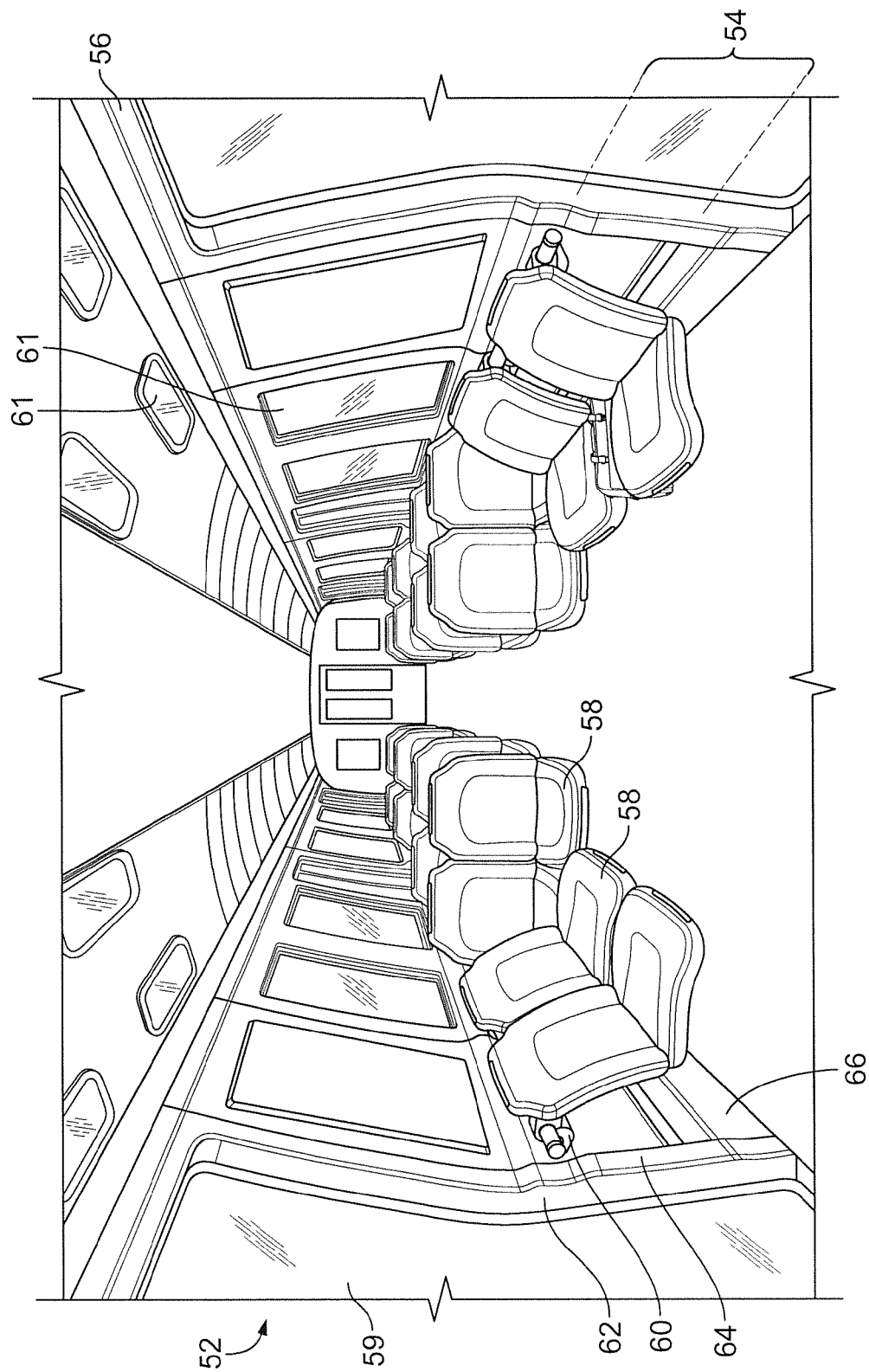
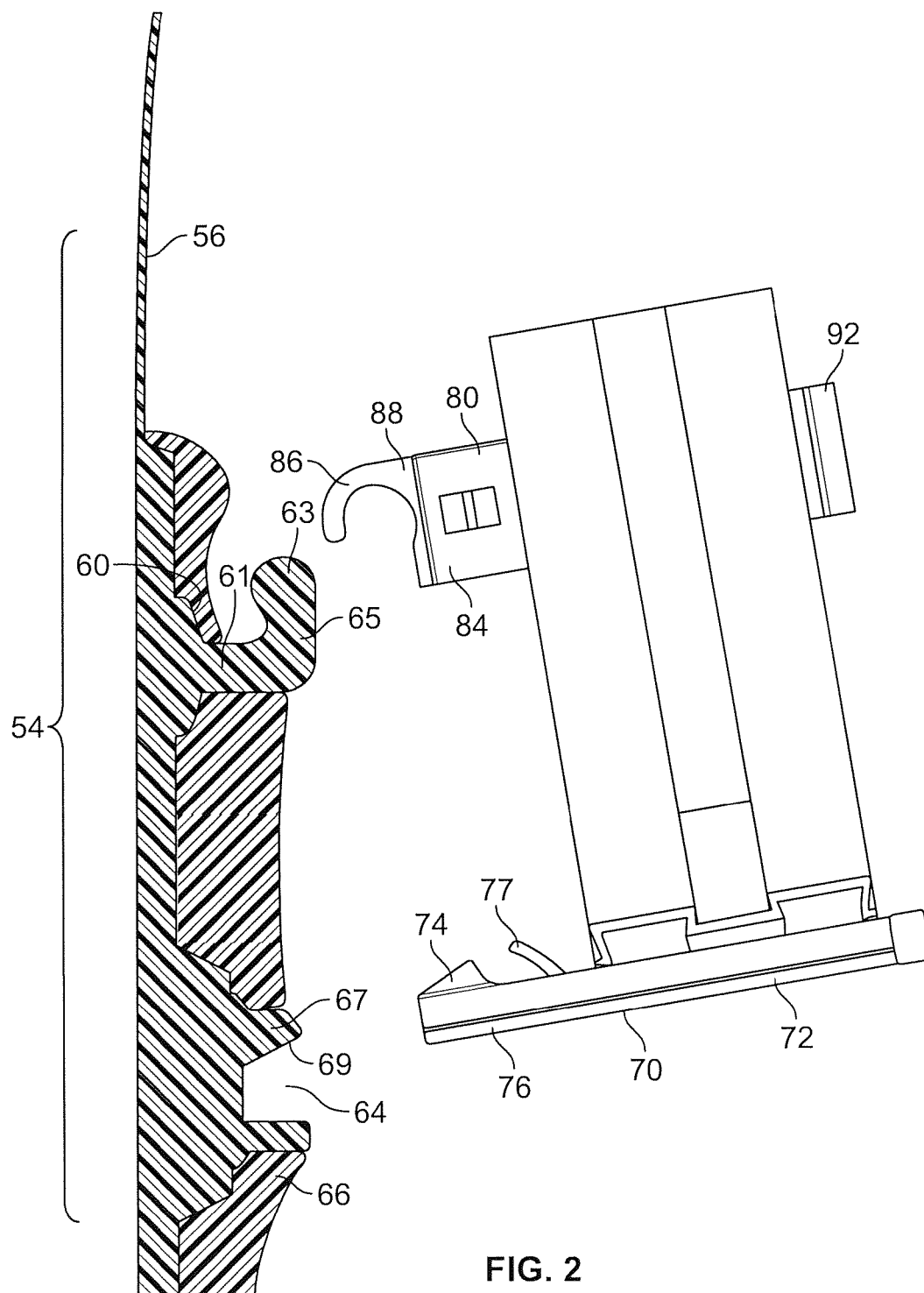


FIG. 1



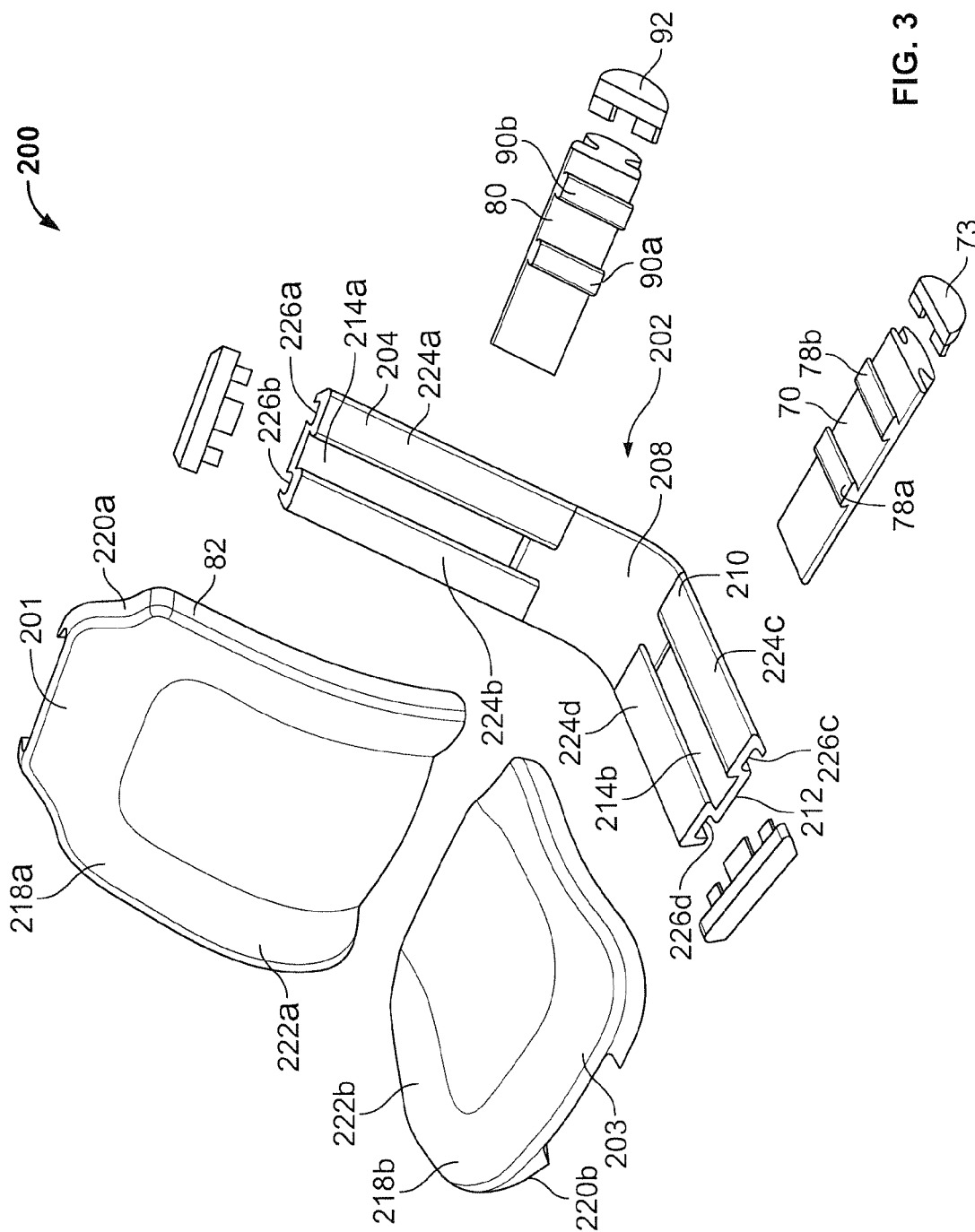


FIG. 3

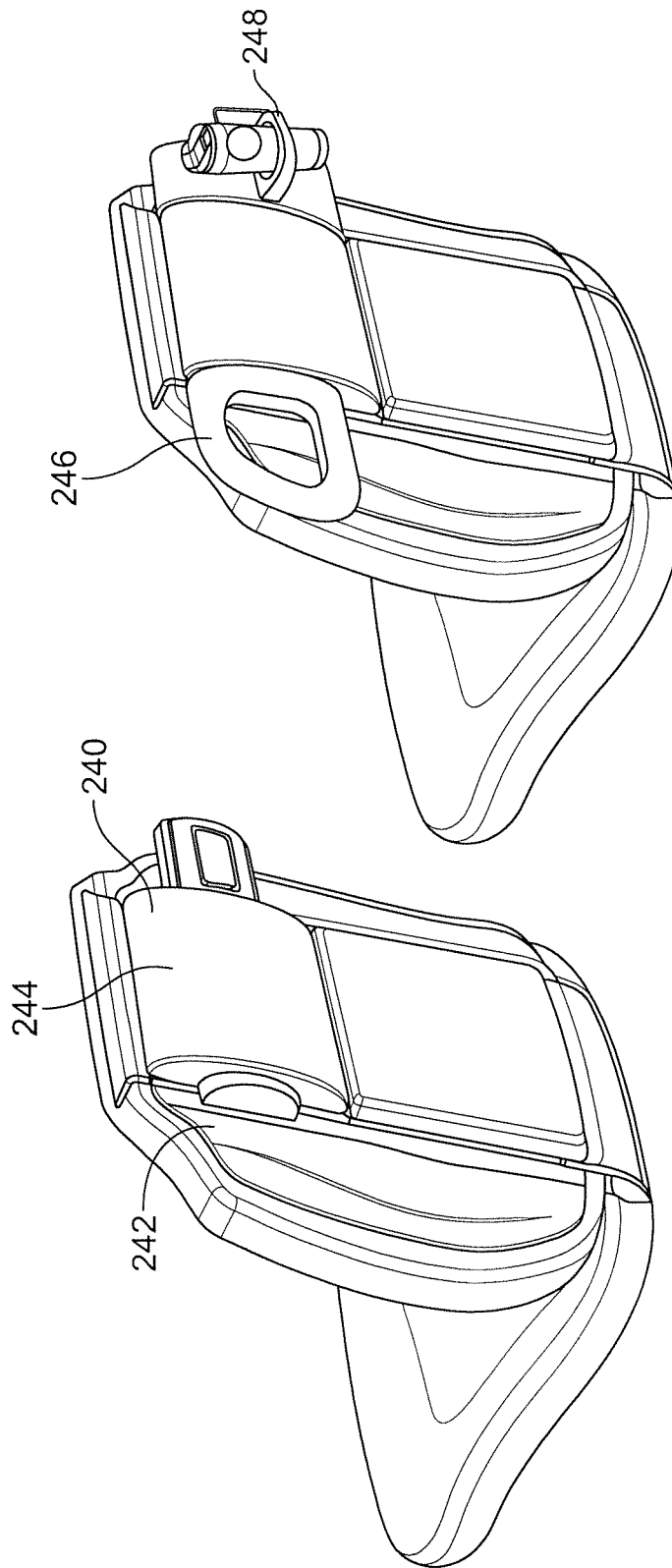
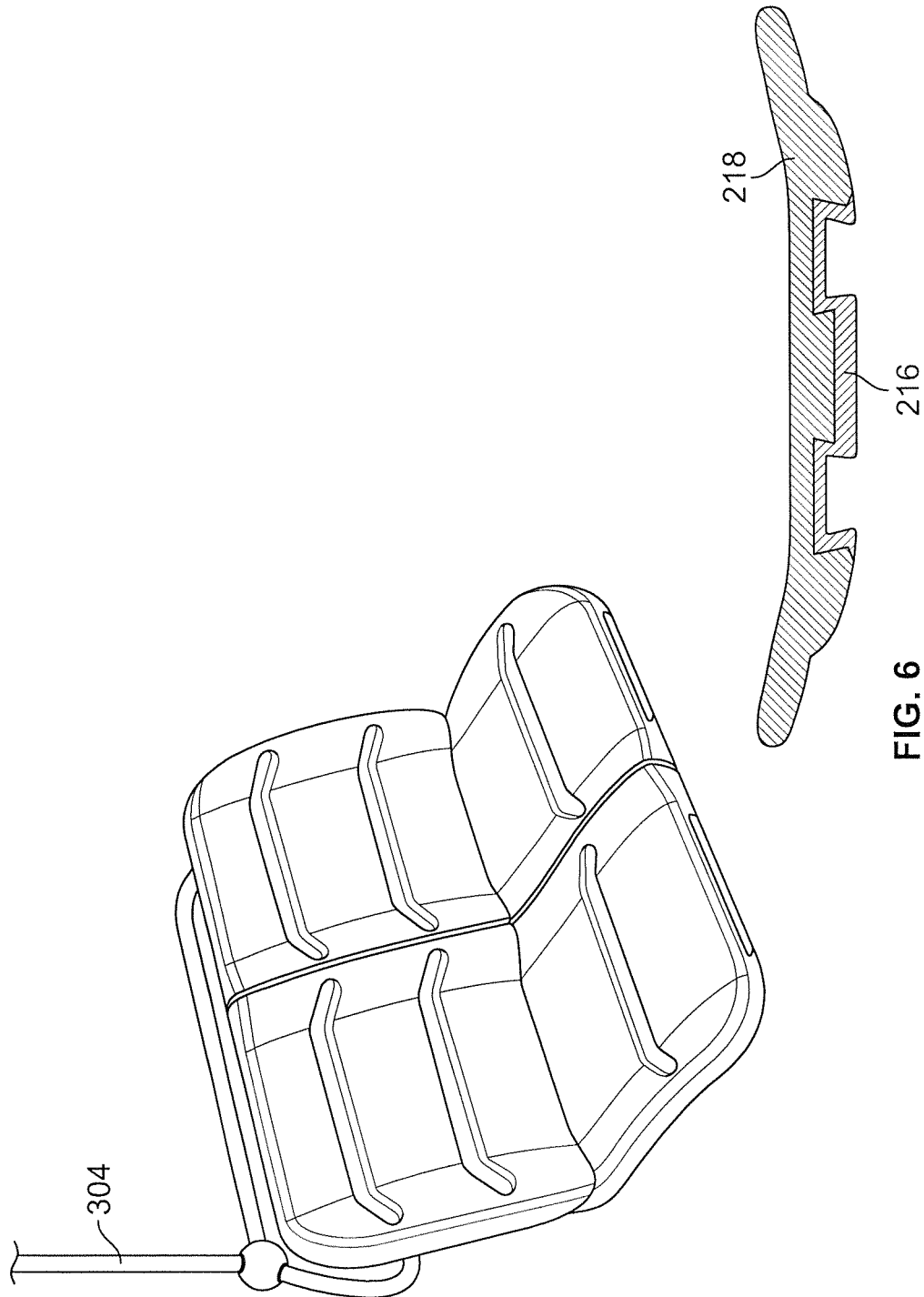


FIG. 5

FIG. 4



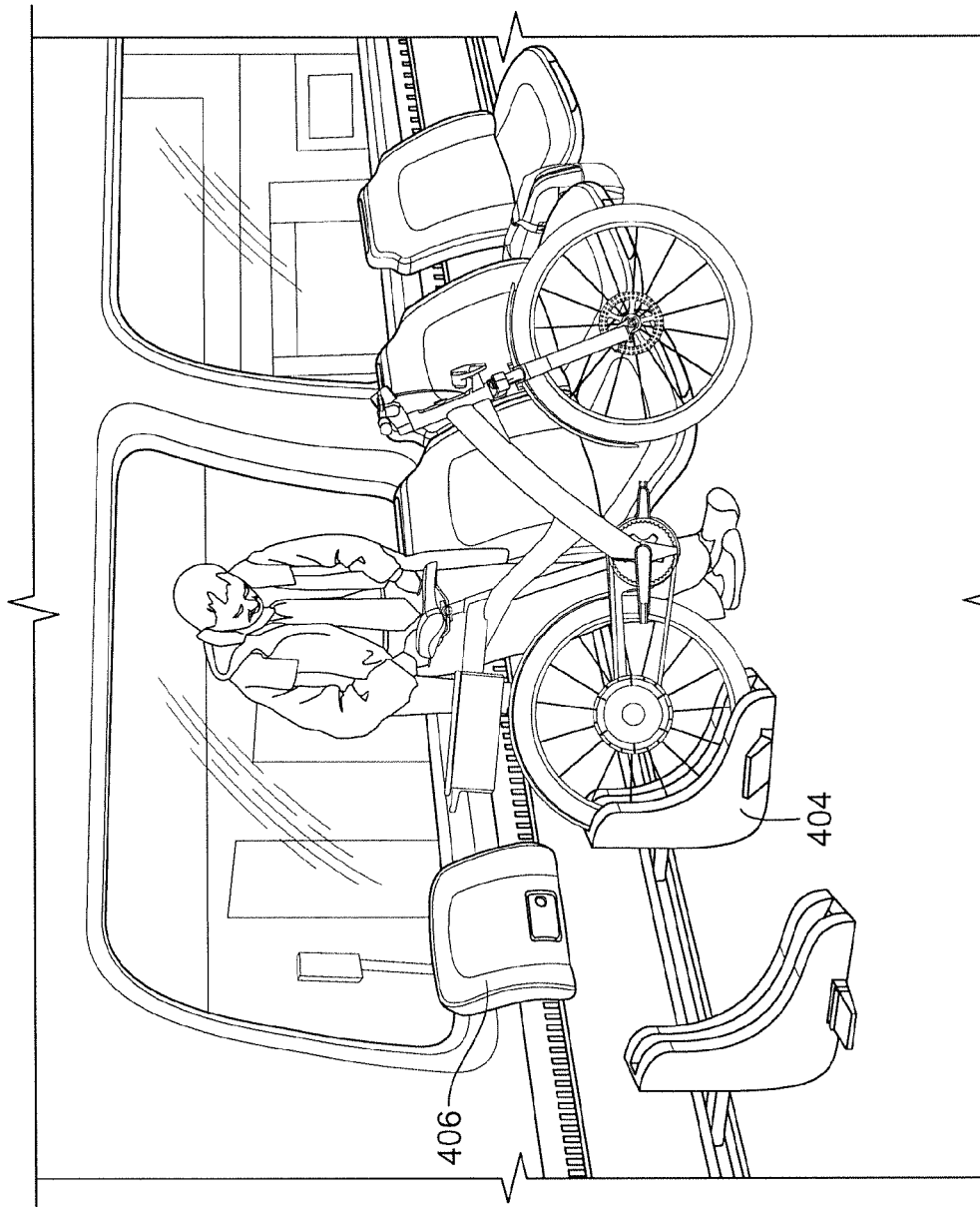


FIG. 7

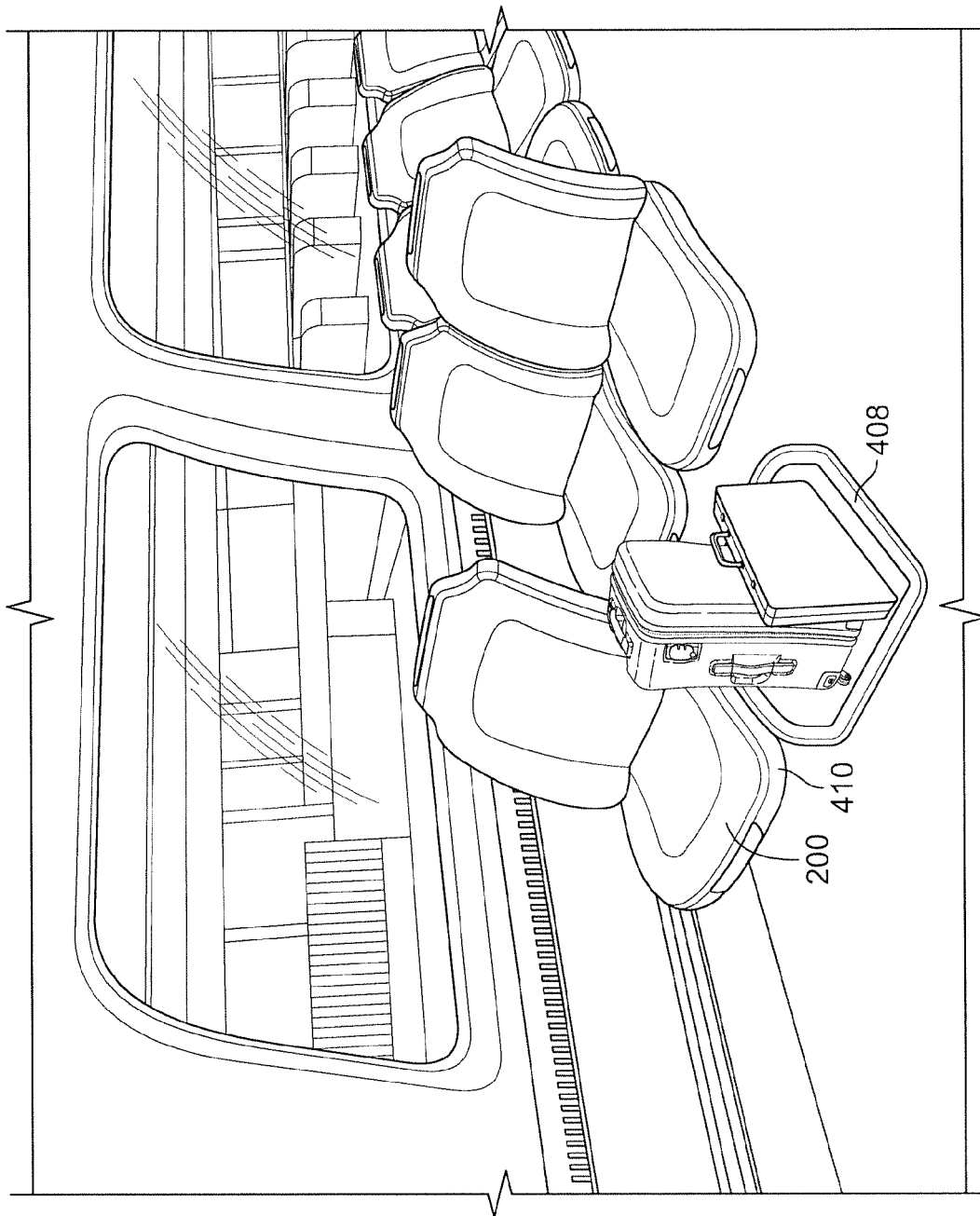


FIG. 8



1

**MODULAR TRANSIT SYSTEM****CROSS REFERENCE TO RELATED APPLICATIONS**

This divisional patent application claims the benefit of U.S. patent application Ser. No. 12/967,959, filed Dec. 14, 2010 now U.S. Pat. No. 8,579,350 and titled MODULAR TRANSIT SYSTEM, which claims the benefit of U.S. Provisional Application No. 61/286,174, filed Dec. 14, 2009, the contents of which are incorporated herein by reference in this application in their entirety.

**REFERENCE REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT**

Not applicable

**SEQUENTIAL LISTING**

Not applicable

**BACKGROUND OF THE DISCLOSURE****1. Field of the Disclosure**

The present disclosure relates generally to a modular transit system, and more particularly, to a modular transit system having a seating system that includes various interchangeable parts.

**2. Description of the Background of the Disclosure**

Development of seating systems in mass transit have traditionally involved a company pre-selecting a desired seating configuration and permanently installing the pre-selected configuration into a transit car or multiple transit cars. The procurement, design, implementation, and manufacturing process may take many years to complete so a company must plan ahead for the types of configurations that the company desires. If a company wishes to deviate from the pre-selected selections, the company must re-order the seating system and/or re-configure the car interior. Either of these options are extremely cost prohibitive.

The traditional seating systems suffer from many disadvantages. For example, once a transit car is designed and manufactured, the configuration of seating is limited to the original design. Still further, the transit company may have special ordered some unique configurations, but the transit car configurations are limited.

**SUMMARY**

A modular seat assembly having an elongate support spine extending longitudinally from a first end to a second end is provided. A seat portion is connected to a front side of the support spine, and each of the seat portion and the support spine includes one of a complementary pair of interlocking portions. The interlocking portion of the seat portion slides onto the interlocking portion of the support spine over the first end. The modular seat assembly further includes an end cap lockably disposed over the first end that prevents the seat portion from sliding off the support spine.

A method of assembling a modular seating system, including a seat portion attachable to a support spine, is also provided. The method comprises the step of releasably attaching the seat portion to the support spine by sliding a projection of one along a channel of the other from one end of the support spine, wherein the projection interlocks with the channel. The method further comprises the step of locking an end cap over

2

the end of the support spine to prevent the seat portion from disassembling from the support spine.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a schematic of a transit car having a track system and a plurality of modular seats attached to the track system;

FIG. 2 is partial cross-sectional view of the track system of FIG. 1 taken generally along the lines of 2-2 of FIG. 1 and having a center spine and struts attached thereto, with the seat portions and features removed therefrom for clarity;

FIG. 3 is an exploded isometric view of a modular seat of FIG. 1;

FIG. 4 is a rear isometric view of the modular seat of FIG. 3 having a first implement;

FIG. 5 is a rear isometric view of the modular seat of FIG. 3 having second and third implements;

FIG. 6 is a front isometric view of a modular seat having a plurality of seats;

FIG. 7 is a schematic of transit car having a track system and a plurality of attachments attached thereto; and

FIG. 8 is a schematic of transit car having a modular seat with an attachment attached thereto.

Other aspects and advantages of the present disclosure will become apparent upon consideration of the following detailed description, wherein similar structures have like or similar reference numerals.

**DETAILED DESCRIPTION**

The present disclosure is directed to a modular transit system and may be embodied in many different forms. Several specific embodiments are discussed herein with the understanding that the present disclosure is to be considered only as an exemplification of the principles of the disclosure, and it is not intended to limit the disclosure to the embodiments illustrated.

Referring to the drawings, FIG. 1 depicts a transit system that includes an elongate transit car 52, a track system 54 attached to a wall 56 of the transit car 52, and a plurality of modular seats 58 attached to and extending outwardly from the track system 54. The transit car 52 includes doors 59 and windows 53 disposed along a length thereof that are of a kind known in the art. As shown in FIG. 2, the track system 54 includes a first channel 60 having a grab bar 61 extending outwardly therefrom. The grab bar 61 includes a bulbous hook 63 extending upwardly from an end 65 of the grab bar 61. The grab bar 61 generally extends outwardly from a medial portion 62 of the wall 56 of the transit car 52. A locking mechanism (not shown) may be included in an interior section of the grab bar 61 such that other components are able to interlock with the grab bar 61. If a seat 58 is not attached to the track system 54, the grab bar 61 and more specifically, the bulbous hook 63, may be utilized to provide an additional surface for a user to grab onto during transit. Any type of locking mechanism known in the art may be utilized including locking mechanisms that allow modular seats and/or attachments to be attached and detached therefrom.

Still referring to FIG. 2, a channel 64 is disposed in a surface 67 in a bottom section 66 of the transit car 52 located adjacent the grab bar 61. The channel 64 may include an attachment component, such as a recess (not shown), in a top surface 69 thereof that is adapted to interact with a support member in the form of a strut 70. The strut 70 is comprised of an elongate base member 72 that includes an upwardly extending notch 74 at a first end 76 thereof. The strut 70

further includes two upwardly extending protrusions **78a**, **78b** that are adapted to interact with the modular seats **58** as described in more detail hereinbelow. The notch **74** is preferably angled and sized to correspond to the channel **67** such that the strut **70** can be aligned with and may be inserted into the channel **67** to secure the strut **70** to the track system **54** disposed on the wall **56** of the transit car **52**. The strut **70** includes a latch **77** that extends upwardly from the base member **72** and is adapted to help secure the strut **70** to the wall **56**. The latch **77** can be rotated from a first, unlocked position to a second, locked position, once the strut **70** is inserted into the channel **67**. The strut **70** further includes an end cap or strut cap **73** (FIG. 3) disposed at an end **75** thereof that provides aesthetic benefits as well as having the capability to accept implements as described in more detail below.

Still referring to FIGS. 2 and 3, a secondary strut **80** is used to provide structural reinforcement and to secure a top portion **82** of the modular seat **58** to the track system **54** attached to the wall **56** of the transit car **52**. The secondary strut **80** includes a latch **83** extending from a front side **84** of the strut **80** that helps secure and lock the strut **80** to the wall **56**. The secondary strut **80** further includes a hook member **86** extending from an end **88** thereof that is adapted to lock into the bulbous hook **63** of the grab bar **61**. As shown in FIG. 3, the secondary strut **80** includes two upwardly extending triangular protrusions **90a**, **90b**, that are adapted to interact with the modular seats **58** as described in more detail hereinbelow. The secondary strut **80** may further include a strut cap **92** that locks into the secondary strut **80** at a second end **94** to provide aesthetic benefits as well as having the capability to accept implements as described in more detail below.

Although the track system **54**, including the grab bar **61** and the channel **64** are depicted as integral with the wall **56** of the transit car **52**, any of the track system **54** components may be installed as separate parts that are attached to an outside surface of the wall **56**. Further, latches **77**, **83** may be utilized to secure the struts **70**, **80** to the track system **54** and/or other locking mechanisms may be used as known in the art such as, for example, lock and key. It is preferable that the latches **77**, **83** are positioned such the seat **58** covers the latches **77**, **83** when the seat **58** is attached to the struts **70**, **80**. The hidden latches **77**, **83** prevent unauthorized persons from accessing and unlocking the struts **70**, **80**.

A modular seat **200**, as best seen in FIG. 3, may be used with the track system **54** disclosed previously herein, or may be used with other track systems as known in the art. The modular seat **200** includes a first generally vertical seat portion **201**, a second generally horizontal seat portion **203**, and a center support spine **202** having an upper section **204** and a lower section **206** connected by a bent portion **208** and adapted to support the first and second seat portions **201**, **203**, respectively. The vertical seat portion **201** and horizontal seat portion **203** may be seat cushions. The center spine **202** includes a plurality of tracks disposed in a front surface **210** and rear surface **212** thereof. The front surface **210** includes an upper channel **214a** and a lower channel **214b** disposed in a central portion therein, wherein each channel **214a**, **214b** comprises a triangular cross sectional profile adapted to receive complementary shaped protrusions (not shown) that extend outwardly along all or a portion of sections **218a**, **218b** of the seat **200**. The protrusions **216a**, **216b** are preferably disposed on bottom surfaces **220a**, **220b** of the seat **200** so that top surfaces **222a**, **222b** of the seat **200** are outwardly facing when the seat **200** is attached to the center spine **202**. Raised portions **224a**, **224b**, **224c**, **224d**, extend outwardly from the upper and lower channels **214a**, **214b**, respectively, and include channels **226a**, **226b**, **226c**, **226d** disposed on back

sides thereof. The channels **226a**, **226b**, **226c**, **226d** are adapted to receive the protrusions **78a**, **78b**, **90a**, **90b**, respectively, that extend upwardly from struts **70**, **80**, as previously discussed herein. The channels and protrusions may be any shape and size so long as the protrusions can be moved along and retained in the channels to releasably secure the seat portions or other attachments to the center support spine **202** in an interlocking connection.

In use, when securing the modular seat **200** to the spine **202**, the first seat portion **201** is slid downwardly onto the spine **202** such that the protrusion **216a** slides into the channel **214a**. The first seat portion **201** is slid downwardly until an edge (not shown) of the protrusion **216a** hits a ridge **217a** that extends into the channel **214a** from the bent portion **208** of the center spine **202**. Once the first seat portion **201** is in place, a spine cap **219a** is inserted into channels **226a**, **226b** to lock the first seat portion **201** into place. Similarly, the second seat portion **203** is slid laterally onto the spine **202** such that the protrusion **216b** slides into the channel **214b**. The second seat portion **203** is slid laterally until an edge (not shown) of the protrusion **216b** hits a ridge **217b** that extends into the channel **214b** from the bent portion **208** of the center spine **202**. Once the second seat portion **203** is in place, a spine cap **219b** is inserted into channels **226c**, **226d** to lock the second seat portion **203** into place. The spine caps **219a**, **219b** may be secured using an interference fit with the channels **226a**, **226b**, **226c**, **226d**, or may utilize other securement methods so long as the first and second seat portions **201**, **203** are firmly locked into place when the spine caps **219a**, **219b** are disposed in the channels **226a**, **226b**, **226c**, **226d** and such that the spine caps **219a**, **219b** can be releasably removed if it is desired to remove the first and second seat portions **201**, **203** from the center spine **202**.

The first and second seat portions **201**, **203** are preferably shaped to the contour of the user's body and are preferably two separate parts, such that each seat portion **201**, **203** can be exchanged independently of the other portion **201**, **203**. The seat portions **201**, **203** may be made of any material known in the art including, for example, vinyl, plastic, cloth, and the like. The first portion **201** may be manufactured from one type of material and the second portion **203** may be manufactured from a second type of material, or both materials may be the same. The seat portions **201**, **203** may also be formed in other styles, configurations, and/or contours as desired.

As shown in FIGS. 4 and 5, the first seat portion **201** may include a variety of implements disposed on a back side **242** thereof. The implements are preferably releasably attached to any and/or all of the strut caps **73**, **92** and/or spine caps **219a**, **219b** utilizing protrusions and channels as described previously herein or using other securement methods as known in the art. A first implement **240**, in the form of a crash pad **244**, is shown in FIGS. 4 and 5. The crash pad **244** is preferably made of a soft material that may help absorb forces during an accident. A second implement in the form of a grip handle **246** is depicted in FIG. 5. A third implement in the form of a cup holder **248** is also depicted in FIG. 5. It is also contemplated that other implements may also be used, such as, for example, head rests, electronic or printed advertisement displays, a coat hook, a cell phone charger, an audio dock, stanchion mounts (shown in FIG. 6), leg/footrests, and the like. Any of the implements may be used alone or in combination with each other. Further, the implements may be permanently secured to the modular seat **200** or may be releasably attached.

The modular seat **200** may comprise a single modular seat **58** configuration as depicted in FIGS. 3, 4, and 5, or may include a plurality of modular seats **302** as shown in FIG. 6.

5

The single modular seat configuration **58** utilizes the center spine **202** and struts **70**, **80** disclosed previously herein to support the modular seat **58**. The plurality of modular seats **302** utilize longer struts (not shown) attached to the bottom and backs of the seats to attach the seats to the wall **56** of the transit car **52** in the same manner as described hereinabove. An additional support member **304**, shown in FIG. 6, may be releaseably attached on one end to the center spine (not shown) of the seat **58** and may be releaseably attached on the other end to the transit car **52**. Other support members may be utilized with the modular seat(s) that provide support and/or attachment capabilities to the transit car **52**.

The single modular seat **58** configuration and/or plurality of modular seats **302** may be oriented in a transverse direction as designated by **400** in FIG. 1, or may be oriented in a center-facing direction as designated by **402**, also shown in FIG. 1. Any combination of a single modular seat or plurality of modular seats in transverse and/or center-facing directions may be used in the transit car **52** as disclosed herein.

Turning to FIGS. 7 and 8, other attachments may be used with the track system **54** in conjunction with and/or instead of the modular seats **200**. For example, an attachment in the form of a bicycle boot **404** is attached to the channel **64** disposed on the wall **56**. Any mechanisms known in the art may be used to releaseably secure the boot **404** to the wall **58**. Another attachment in the form of a lean pad **406** is also depicted in FIG. 7. The lean pad **406** is attached to the grab bar **61** using a hook member (not shown) disposed on a back side of the lean pad **406** that is adapted to latch onto the bulbous hook **63** of the grab bar **61**. Any of the attachments may also be attached to either the channel **64** and/or the grab bar **61** utilizing methods known in the art or methods disclosed herein.

Referring to FIG. 8, an attachment may be used in conjunction with and/or may be releaseably attached to the modular seat **200**. For example, an attachment in the form of a luggage rack **408** is attached to a side **410** of the modular seat **200**. The luggage rack **408** may be attached to the seat **200** utilizing the strut system disclosed previously herein or may be attached using other methods as known in the art.

In all of the methodologies disclosed herein, it is contemplated that many of the parts are releaseably attached to each other to allow for the transit car **52** to be easily reconfigured. Further, the track system **54** disclosed herein may be used with the modular seat **200** described herein or may be adapted to be used with other seating systems as known in the art. The modular seat **200** disclosed herein may be used in conjunction with the track system **54** disclosed herein or may be used independently in other seating systems as known in the art. Further, although a transit car **52** is disclosed, it is contemplated that the track system **54** and/or modular seating **200** could be used in other settings including a concert venue, a stadium, a boat, and/or other locations that utilize various seating arrangements.

Any of the embodiments described herein may be modified to include any of the structures or methodologies disclosed in connection with other embodiments.

#### INDUSTRIAL APPLICABILITY

The present disclosure provides a modular transit system having a track system and/or modular seating that can be used

6

to modify a transit car. The track system can support a variety of attachments to allow the transit car to be reconfigured.

Numerous modifications to the present disclosure will be apparent to those skilled in the art in view of the foregoing description. Accordingly, this description is to be construed as illustrative only and is presented for the purpose of enabling those skilled in the art to make and use the disclosure and to teach the best mode of carrying out same. The exclusive rights to all modifications which come within the scope of the appended claims are reserved.

We claim:

1. A modular seat assembly comprising:

an elongate support spine extending longitudinally from a first end to a second end;

a seat portion connected to a front side of the support spine, wherein each of the seat portion and the support spine includes one of a complementary pair of interlocking portions, and wherein the interlocking portion of the seat portion slides onto the interlocking portion of the support spine over the first end;

an end cap lockably disposed over the first end, wherein the end cap prevents the seat portion from sliding off of the support spine; and

a first strut secured to a back side of the upper portion and a second strut secured to a back side of the lower portion, wherein each of the first strut and the second strut extend longitudinally in a direction transverse to the support spine;

wherein the end cap releaseably locks onto the first end and may be unlocked and released therefrom in order to remove the seat portion from the support spine;

wherein the interlocking portion of the support spine comprises a first elongate track extending longitudinally along the support spine from the first end, and the interlocking portion of the seat portion comprises a second elongate track that slidably interfits with the first elongate track; and

wherein the central portion comprises a bend and the upper portion projects upwardly from the central portion and the lower portion projects horizontally from the central portion at an angle from the upper portion.

2. The modular seat assembly of claim 1, wherein the first and second elongate tracks comprise interlocking connections.

3. The modular seat assembly of claim 1, wherein the support spine comprises an upper portion, a lower portion, and central portion that connects the upper portion to the lower portion, wherein the upper portion locks onto a first end of the central portion and the lower portion locks onto a second end of the central portion.

4. The modular seat assembly of claim 1, wherein the first strut is connected to the upper portion by an interlocking connection.

5. The modular seat assembly of claim 1, wherein the first strut has a first end that extends laterally to beyond one lateral side of the seat portion, and wherein the strut further comprises a receiver at the first end thereof adapted to fit over and receive a support member therein.

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